

CLAIM AMENDMENTS

What is claimed is:

1. (Currently Amended) A method in a network element comprising:
converting Point to Point Protocol (PPP) protocol data units (PDUs)
encapsulated according to different protocols into PPP PDUs within a uniform Point to Point Protocol over Ethernet (PPPoE) encapsulation; and
transmitting the uniformly encapsulated PPPoE PDUs.
2. (Previously Presented) A method in a network element comprising:
using a Point to Point Protocol over Ethernet (PPPoE) session identifier to
track a first flow of PPP protocol data units (PDUs) encapsulated with a non-
Ethernet protocol;
converting each PDU of the first flow of PPP PDUs into PPPoE PDUs using the
session identifier; and
converting each PDU of a second flow of PPPoE PDUs with the session
identifier into PPP PDUs encapsulated with the non-Ethernet protocol.
3. (Previously Presented) A method in a network element comprising:
obtaining a Point to Point Protocol over Ethernet (PPPoE) session identifier for
a first flow of PPP protocol data units (PDUs) that are encapsulated with a non-
Ethernet protocol, wherein the first flow of PPP PDUs are received over a first port;

converting each PPP PDU of the first flow into a converted first flow of PPPoE PDUs based on the session identifier for the first flow;

transmitting the converted first flow of PPPoE PDUs via a second port; and

converting each PPP PDU of a second flow of PPPoE PDUs received via the second port into a converted second flow of PPP PDUs encapsulated with the non-Ethernet protocol, wherein the second flow of PPPoE PDUs received via the second port corresponds to the PPPoE session identifier.

4. (Previously Presented) A network element comprising:

a link layer port to receive link layer traffic encapsulated according to a link layer protocol;

a link layer demultiplexer to demultiplex link layer traffic received via the link layer port into Point to Point Protocol over Ethernet (PPPoE) traffic, PPP over non-Ethernet (PPPoX) traffic, and non-PPP traffic;

a virtual router coupled with the link layer demultiplexer, to forward non-PPP traffic received from the link layer demultiplexer;

a Point to Point Protocol (PPP) switch module having,

a PPPoX proxy module to convert PPPoX traffic received from the link layer demultiplexer into PPPoE traffic and to convert PPPoE traffic received from a PPPoE multiplexer/demultiplexer into PPPoX traffic;

a PPPoE switch module to switch PPPoE traffic received from the link layer demultiplexer and from the PPPoE multiplexer/demultiplexer; and

the PPPoE multiplexer/demultiplexer coupled with the PPPoX proxy module and the PPPoE switch module, the PPPoE multiplexer/demultiplexer

to multiplex PPPoE traffic received from the PPPoE switch module and the PPPoX proxy module and to demultiplex PPPoE traffic into different traffic flows according to their session identifier.

5. (Previously Presented) A network comprising:

a first network element

to receive a set of one or more flows of Point to Point Protocol over Ethernet (PPPoE) and a set of one or more flows of Point to Point Protocol over non-Ethernet (PPPoX) traffic via a first port,

to obtain a Point to Point Protocol over Ethernet (PPPoE) session identifier for each of the set of flows of PPPoX traffic,

to convert each of the set of flows of PPPoX traffic into flows of PPPoE traffic in accordance with their session identifiers,

to multiplex the flows of PPPoE traffic,

to transmit the multiplexed PPPoE traffic via a second port; and

a second network element coupled with the first network element, the second network element to receive the multiplexed PPPoE traffic and to transmit the multiplexed PPPoE flows to a set of one or more aggregators

6. (Previously Presented) A network comprising:

a set of one or more service provider points of presence (PoPs) to receive traffic that includes Point to Point Protocol over non-Ethernet (PPPoX) traffic on a set of one or more subscriber side flows and to tunnel the traffic through a network cloud;

a PoP Major of the service provider coupled with the network cloud, the PoP Major to receive the PPPoX traffic and to transmit the traffic as Point to Point Protocol over Ethernet (PPPoE) traffic along a single media, wherein the set of one or more service provider PoPs are to convert each packet within the received traffic that is non-Ethernet traffic into PPPoE traffic by matching an entry in a data structure that provides a PPPoE session identifier for each packet to be converted; and

an aggregators coupled with the PoP Major, the aggregator to process the PPPoE traffic.

7. (Currently Amended) A machine-storage medium that provides instructions, which when executed by a set of one or more processors, cause said set of processors to perform operations in a network element comprising:

converting Point to Point Protocol (PPP) protocol data units (PDUs) encapsulated according to different protocols into PPP PDUs with a uniform Point to Point Protocol over Ethernet (PPPoE) encapsulation; and
transmitting the uniformly encapsulated PPPoE PDUs.

8. (Previously Presented) The method of claim 1, wherein the uniform encapsulation is PPPoE encapsulation.

9. (Previously Presented) The method of claim 1, wherein the converting is performed by matching an entry in a data structure that provides a PPPoE session identifier for each PPP PDU to be converted.

10. (Previously Presented) The method of claim 9, wherein the data structure is not created until a proxy module within the network element attempts to create an entry in the data structure.

11. (Previously Presented) The method of claim 9, wherein the data structure is modified to indicate that a subscriber side flow is active once a PPP session is opened.

12. (Previously Presented) The method of claim 1, further comprising:
receiving PPP PDUs with the uniform encapsulation at a set of one or more aggregator side ports; and
converting the PPP PDUs with the uniform encapsulation back into PPP PDUs encapsulated according to different protocols.

13. (Previously Presented) The method as in claim 1, wherein the network element is agnostic of the encapsulation of the PPP PDUs to be converted.

14. (Previously Presented) The method of claim 2, wherein the converting each PDU is performed by matching an entry in a data structure within the network element having a relationship between the session identifier and the first flow.

15. (Previously Presented) The method of claim 14, wherein the data structure is not created until a proxy module within the network element attempts to create an entry in the data structure.
16. (Previously Presented) The method of claim 14, wherein the data structure is modified to indicate that the first flow is active once a PPP session is opened.
17. (Previously Presented) The method as in claim 2, wherein the network element is agnostic of the encapsulation of the first flow and the converting each PDU is performed using the session identifier.
18. (Previously Presented) The method of claim 3, wherein the converting each PDU is performed by matching an entry in a data structure within the network element having a relationship between the session identifier and the first flow.
19. (Previously Presented) The method of claim 18, wherein the data structure is not created until a proxy module within the network element attempts to create an entry in the data structure.
20. (Previously Presented) The method of claim 18, wherein the data structure is modified to indicate that the first flow is active once a PPP session is opened.
21. (Previously Presented) The method as in claim 3, wherein the network element is agnostic of the encapsulation of the first flow.

22. (Previously Presented) The network element of claim 4, wherein the PPPoX proxy module is to convert the PPPoX traffic by matching an entry in a data structure that provides a PPPoE session identifier for the PPPoX traffic to be converted.

23. (Previously Presented) The network element of claim 22, wherein the data structure is not created until the PPPoX proxy module attempts to create an entry in the data structure.

24. (Previously Presented) The network element of claim 22, wherein the data structure is modified to indicate that the PPPoX traffic is active once a PPP session is opened.

25. (Previously Presented) The network element as in claim 4, wherein the network element is agnostic of the encapsulation of the PPPoX traffic received at the link layer port.

26. (Previously Presented) The network element of claim 5, wherein the first network element is to convert each of the set of flows of PPPoX traffic by matching an entry in a data structure that provides a PPPoE session identifier for each of the set of flows to be converted.

27. (Previously Presented) The network element of claim 26, wherein the data structure is not created until the first network element attempts to create an entry in the data structure.

28. (Previously Presented) The network element of claim 26, wherein the data structure is modified to indicate that a subscriber side flow is active once a PPP session is opened.

29. (Previously Presented) The network element as in claim 5, wherein the first network element is agnostic of the encapsulation of the PPPoX traffic received by the first element.

30. (Cancelled).

31. (Previously Presented) The network of claim 30, wherein the data structure is not created until the set of one or more service provider PoPs attempt to create an entry in the data structure.

32. (Previously Presented) The network of claim 30, wherein the data structure is modified to indicate that the set of one or more subscriber side flows is active once a PPP session is opened.

33. (Previously Presented) The network as in claim 6, wherein the set of one or more service provider PoPs is agnostic of the encapsulation of the traffic received by the set of one or more service provider PoPs.

34. (Previously Presented) The machine storage medium of claim 7, wherein the uniform encapsulation is PPPoE encapsulation.

35. (Previously Presented) The machine storage medium of claim 7, wherein the converting is performed by matching an entry in a data structure that provides a PPPoE session identifier for each PPP PDU to be converted.

36. (Previously Presented) The machine storage medium of claim 35, wherein the data structure is not created until a proxy module within the network element attempts to create an entry in the data structure.

37. (Previously Presented) The machine storage medium of claim 35, wherein the data structure is modified to indicate that a subscriber side flow is active once a PPP session is opened.

38. (Previously Presented) The machine storage medium of claim 7 that provides instructions, which when executed by a set of one or more processors, cause said set of processors to perform operations further comprising :

receiving PPP PDUs with the uniform encapsulation at a set of one or more aggregator side ports; and

converting the PPP PDUs with the uniform encapsulation back into PPP PDUs encapsulated according to different protocols.

39 (Previously Presented) The machine storage medium of claim 7, wherein the network element is agnostic of the encapsulation of the PPP PDUs to be converted.

40. (Previously Presented) A method in a network element, comprising:

receiving a first data packet that is not in a format of an output media to the network from a subscriber that accesses the network through the network element;

converting the first data packet into the format of the output media based on a session identifier;

receiving a second data packet encapsulated in the format of the output media; and

sending the first data packet and the second data packet in the format of the output media.

41. (Previously Presented) The method as in claim 40, wherein the output media is an Ethernet transmission line.

42. (Previously Presented) The method as in claim 40, wherein the network element is agnostic of the encapsulation of the first data packet.

43. (Previously Presented) The method of claim 40, wherein the format of the output media is PPPoE encapsulation.

44. (Previously Presented) The method of claim 40, wherein the converting of the first data packet is performed by matching an entry in a data structure within the network element having a relationship between the session identifier and the first data packet.

45. (Previously Presented) The method of claim 44, wherein the data structure is not created until a proxy module within the network element attempts to create an entry in the data structure.

46. (Previously Presented) The method of claim 44, wherein the data structure is modified to indicate that a subscriber side flow that includes the first data packet is active once a PPP session is opened.

47. (Previously Presented) The method of claim 40, further comprising:
receiving a third data packet with the session identifier in a format of the output media at a set of one or more aggregator side ports; and
converting the third data packet back into the format of the first data packet based on the session identifier.

48. (Previously Presented) A method for enabling transmission of Point to Point Protocol (PPP) packets over a single media in a network element, comprising:

receiving a plurality of data packets;

converting the plurality of data packets into Point to Point Protocol over Ethernet (PPPoE) data packets by matching an entry in a data structure that provides a PPPoE session identifier for each one of the plurality of data packets to be converted; and

transmitting the converted plurality of PPPoE data packets over a single media.

49. (Previously Presented) The method as in claim 48, wherein the single media is an Ethernet transmission line.

50. (Previously Presented) The method as in claim 48, wherein the receiving a plurality of data packets is agnostic of the encapsulation of the plurality of data packets.

51. (Previously Presented) The method of claim 48, wherein the data structure is not created until a proxy module within the network element attempts to create an entry in the data structure.

52. (Previously Presented) The method of claim 48, wherein the data structure is modified to indicate that a subscriber side flow is active once a PPP session is opened.

53. (Previously Presented) A network element, comprising:

a demultiplexer to separate a plurality of packets into Internet Protocol (IP) data packets and PPP over non-Ethernet (PPPoX) data packets;

a virtual router to receive the IP data packets;

a Point to Point Protocol (PPP) switch module to receive PPPoX data packets and to convert the PPPoX data packets into Point to Point over Ethernet (PPPoE) data packets based on a session identifier; and

a port to send the converted data packets.

54. (Previously Presented) The network element of claim 53, wherein the PPP switch module is to convert the PPPoX data packets by matching an entry in a data structure that provides a PPPoE session identifier for each one of the PPPoX data packets to be converted.

55. (Previously Presented) The network element of claim 54, wherein the data structure is not created until a proxy module within the PPP switch module attempts to create an entry in the data structure.

56. (Previously Presented) The network element of claim 54, wherein the data structure is modified to indicate that a subscriber side flow is active once a PPP session is opened.

57. (Previously Presented) The network element of claim 53, wherein the port also receives PPPoE data packets from a set of one or more aggregators, and wherein the PPP switch module also receives PPPoE data packets from the port and

reconverts the PPPoE data packets into PPPoX data packets based on the session identifier for each one of the PPPoE data packets.

58. (Previously Presented) The network element as in claim 53, wherein the network element is agnostic of the encapsulation of the PPPoX data packets separated by the demultiplexer.